

10/29/99  
JC682 U.S. PTO

# UTILITY PATENT APPLICATION TRANSMITTAL

## (Small Entity)

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Docket No.

Total Pages in this Submission

**TO THE ASSISTANT COMMISSIONER FOR PATENTS**
**Box Patent Application**  
**Washington, D.C. 20231**

Transmitted herewith for filing under 35 U.S.C. 111(a) and 37 C.F.R. 1.53(b) is a new utility patent application for an invention entitled:

**WATER FREEZE CONTROL FOR HOT TUB SPA**

and invented by:

**Michel Authier and Benoit Laflamme**JC678 U.S. PRO  
09/429939  
10/29/99**If a CONTINUATION APPLICATION, check appropriate box and supply the requisite information:**
 **Continuation**    **Divisional**    **Continuation-in-part (CIP)** of prior application No.: \_\_\_\_\_

Which is a:

 **Continuation**    **Divisional**    **Continuation-in-part (CIP)** of prior application No.: \_\_\_\_\_

Which is a:

 **Continuation**    **Divisional**    **Continuation-in-part (CIP)** of prior application No.: \_\_\_\_\_

Enclosed are:

**Application Elements**

1.  Filing fee as calculated and transmitted as described below
2.  Specification having 11 pages and including the following:
  - a.  Descriptive Title of the Invention
  - b.  Cross References to Related Applications (*if applicable*)
  - c.  Statement Regarding Federally-sponsored Research/Development (*if applicable*)
  - d.  Reference to Microfiche Appendix (*if applicable*)
  - e.  Background of the Invention
  - f.  Brief Summary of the Invention
  - g.  Brief Description of the Drawings (*if drawings filed*)
  - h.  Detailed Description
  - i.  Claim(s) as Classified Below
  - j.  Abstract of the Disclosure

# UTILITY PATENT APPLICATION TRANSMITTAL (Small Entity)

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Docket No.

Total Pages in this Submission

## Application Elements (Continued)

3.  Drawing(s) (when necessary as prescribed by 35 USC 113)  
a.  Formal      b.  Informal      Number of Sheets 5

4.  Oath or Declaration  
a.  Newly executed (original or copy)       Unexecuted  
b.  Copy from a prior application (37 CFR 1.63(d)) (for continuation/divisional application only)  
c.  With Power of Attorney       Without Power of Attorney  
d.  DELETION OF INVENTOR(S)  
Signed statement attached deleting inventor(s) named in the prior application,  
see 37 C.F.R. 1.63(d)(2) and 1.33(b).

5.  Incorporation By Reference (usable if Box 4b is checked)  
The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied  
under Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby  
incorporated by reference therein.

6.  Computer Program in Microfiche

7.  Genetic Sequence Submission (if applicable, all must be included)  
a.  Paper Copy  
b.  Computer Readable Copy  
c.  Statement Verifying Identical Paper and Computer Readable Copy

## Accompanying Application Parts

8.  Assignment Papers (cover sheet & documents)

9.  37 CFR 3.73(b) Statement (when there is an assignee)

10.  English Translation Document (if applicable)

11.  Information Disclosure Statement/PTO-1449       Copies of IDS Citations

12.  Preliminary Amendment

13.  Acknowledgment postcard

14.  Certificate of Mailing  
 First Class     Express Mail (Specify Label No.): \_\_\_\_\_

**UTILITY PATENT APPLICATION TRANSMITTAL  
(Small Entity)**

*(Only for new nonprovisional applications under 37 CFR 1.53(b))*

Docket No.

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**Accompanying Application Parts (Continued)**

15.  Certified Copy of Priority Document(s) *(if foreign priority is claimed)*

16.  Small Entity Statement(s) - Specify Number of Statements Submitted: 2

17.  Additional Enclosures *(please identify below):*

**Fee Calculation and Transmittal**

**CLAIMS AS FILED**

For	#Filed	#Allowed	#Extra	Rate	Fee
<b>Total Claims</b>	12	- 20 =	0	x \$9.00	\$0.00
<b>Indep. Claims</b>	2	- 3 =	0	x \$39.00	\$0.00
<b>Multiple Dependent Claims (check if applicable)</b>	<input type="checkbox"/>				\$0.00
				<b>BASIC FEE</b>	\$380.00
<b>OTHER FEE (specify purpose)</b>				<b>Assignment recording fee</b>	\$40.00
				<b>TOTAL FILING FEE</b>	\$420.00

A check in the amount of \$420.00 to cover the filing fee is enclosed.

The Commissioner is hereby authorized to charge and credit Deposit Account No. as described below. A duplicate copy of this sheet is enclosed.

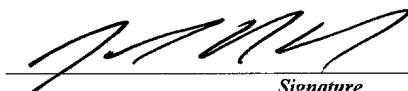
Charge the amount of \_\_\_\_\_ as filing fee.

Credit any overpayment.

Charge any additional filing fees required under 37 C.F.R. 1.16 and 1.17.

Charge the issue fee set in 37 C.F.R. 1.18 at the mailing of the Notice of Allowance, pursuant to 37 C.F.R. 1.311(b).

Dated: 10/29/99



Signature

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CC:

**VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY  
STATUS (37 CFR 1.9(f) AND 1.27 (b)) - INDEPENDENT INVENTOR**

Docket No.

Serial No.

Filing Date  
herewith

Patent No.

Issue Date

Applicant/ **Michel Authier and Benoit Laflamme**  
Patentee:

Invention: **WATER FREEZE CONTROL FOR HOT TUB SPA**

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees under section 41(a) and (b) of Title 35, United States Code, to the Patent and Trademark Office with regard to the invention entitled above and described in:

the specification to be filed herewith.  
 the application identified above.  
 the patent identified above.

I have not assigned, granted, conveyed or licensed and am under no obligation under contract or law to assign, grant, convey or license, any rights in the invention to any person who could not be classified as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

No such person, concern or organization exists.  
 Each such person, concern or organization is listed below.

\*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities (37 CFR 1.27)

FULL NAME **Gecko Electronique, Inc.**ADDRESS **450, des Canetons, Quebec (Quebec), Canada, G2E 5W6**

Individual  Small Business Concern  Nonprofit Organization

FULL NAME

ADDRESS

Individual  Small Business Concern  Nonprofit Organization

FULL NAME

ADDRESS

Individual  Small Business Concern  Nonprofit Organization

FULL NAME

ADDRESS

Individual  Small Business Concern  Nonprofit Organization

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I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(e))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF INVENTOR Michael Antmer

SIGNATURE OF INVENTOR

DATE: 28/10/99

NAME OF INVENTOR Benefit Leffman

SIGNATURE OF INVENTOR

DATE: 28/10/99

NAME OF INVENTOR

SIGNATURE OF INVENTOR

DATE:

<b>VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS (37 CFR 1.9(f) AND 1.27 (c)) - SMALL BUSINESS CONCERN</b>				Docket No.
Serial No.	Filing Date herewith	Patent No.	Issue Date	
<p>Applicant/ <b>Michel Authier and Benoit Laflamme</b> Patentee:</p> <p>Invention: <b>WATER FREEZE CONTROL FOR HOT TUB SPA</b></p>				
<p>I hereby declare that I am:</p> <p><input type="checkbox"/> the owner of the small business concern identified below:  <input checked="" type="checkbox"/> an official of the small business concern empowered to act on behalf of the concern identified below:</p>				
<p>NAME OF CONCERN: <b>Gecko Electronique, Inc.</b></p> <p>ADDRESS OF CONCERN: <b>450, des Canetons, Quebec (Quebec), Canada, G2E 5W6</b></p>				
<p>I hereby declare that the above-identified small business concern qualifies as a small business concern as defined in 37 CFR 121.3-18, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees under Section 41(a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.</p>				
<p>I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the above identified invention described in:</p> <p><input checked="" type="checkbox"/> the specification filed herewith with title as listed above.  <input type="checkbox"/> the application identified above.  <input type="checkbox"/> the patent identified above.</p>				
<p>If the rights held by the above-identified small business concern are not exclusive, each individual, concern or organization having rights to the invention is listed on the next page and no rights to the invention are held by any person, other than the inventor, who could not qualify as an independent inventor under 37 CFR 1.9(c) or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).</p>				

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Page 3 of 2

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

- no such person, concern or organization exists.
- each such person, concern or organization is listed below.

FULL NAME

ADDRESS

Individual

Small Business Concern

Nonprofit Organization

FULL NAME

ADDRESS

Individual

Small Business Concern

Nonprofit Organization

FULL NAME

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Small Business Concern

Nonprofit Organization

FULL NAME

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Individual

Small Business Concern

Nonprofit Organization

Separate verified statements are required from each named person, concern or organization having rights to the invention according to their status as small entities. (37 CFR 1.27)

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF PERSON SIGNING

Michel Audier

TITLE OF PERSON SIGNING

President

OTHER THAN OWNER:

President

ADDRESS OF PERSON SIGNING:

106 St-Denis Corridor  
St-Augustin, (Quebec), Canada  
G3A 2X3

SIGNATURE



DATE: 28/10/99

## WATER FREEZE CONTROL FOR HOT TUB SPA

This invention relates to spas, and, in particular to spas used in climates where water tends to freeze when the temperature gets cold. This application claims priority of provisional application Serial No. 60/106,229 filed 10/30/98.

### BACKGROUND OF THE INVENTION

A spa (also commonly known as a "hot tub") is a therapeutic bath in which all or part of the body is exposed to forceful whirling currents of hot water. Spas are popular throughout the world but are especially popular in areas of cold climate, such as at ski resorts and other extremely cold locations. Spa users tend to find it especially pleasurable to move from an area of extreme cold to the comfort of a nice, hot spa. However, there is an unfortunate problem associated with operating and maintaining a spa in a cold location. If a spa is operated in a climate where water tends to freeze, unless appropriate measures are taken, water inside the plumbing of the spa may also freeze and cause damage to the plumbing. Conventionally, the water in the tub itself is maintained in its liquid state by the temperature control system of the spa which keeps the water in the tub at a temperature that is high enough to prevent freezing of the water in the tub. The problem with which the industry is faced, however, is that the water in the plumbing system of the spas will cool down much faster than the water in the tub itself. Therefore, the water in the plumbing may freeze while the water in the tub is still in its liquid state.

U.S. Pat. Nos. 5,361,215, 5,550,753, and 5,559,720 disclose a solution to the problem of water freezing in spa plumbing. These patents teach that the problem can be solved through the installation of temperature sensors that sense the temperature of the water in the plumbing and the tub and will circulate the water through the plumbing if the water in the plumbing gets too cold.

A prior art spa 1 is shown in FIG. 1. The prior art spa has temperature sensor 3 which measures the water temperature inside tub 7 and temperature sensor 5 which measures the water temperature inside water heater 9. In the prior art, sensor 5 is used not only to protect the user from excessive temperature, but also for freeze protection. To protect the

user for excessive temperature, sensor 5 will send an electrical signal to spa controller 11 if it senses a temperature greater than approximately 119 deg. F. If this temperature is detected by sensor 5, spa controller 11 will then shut – off water heater 9.

As a freeze protection system, the prior art works as follows. While spa users are using the spa, they can manually set the temperature of the spa by entering the desired temperature into spa controller 11 via keypad 15. When the spa is no longer in use, and the users have left the spa, spa controller 11 continues to automatically control the temperature of the spa. In the prior art, when the temperature in spa tub 7 falls below a preset temperature (as detected by sensor 3), sensor 3 sends a signal to spa controller 11. Spa controller 11 turns on heater 9 and water pump 13. Hot water is then pumped into spa tub 7. Heater 9 and water pump 13 will remain on until sensor 3 reports a temperature above the preset temperature. Likewise, in the prior art, when sensor 5 senses a plumbing temperature less than a preset temperature (for example, 40 deg. F.), it will cause spa controller 11 to turn on heater 9 and water pump 13. Hot water is then pumped back into spa tub 7. Heater 9 and water pump 13 will remain on until sensor 5 reports a temperature greater than the preset temperature (i.e., 40 deg. F.).

Unfortunately, the solution offered by the prior art has serious problems. If there is more than one plumbing circuit in a spa, more than one temperature sensor will be needed. In other words, each plumbing circuit will require its own temperature sensor that provides information to spa controller 11. Because of the extra expense involved, Applicants know of no system that currently offers separate sensors for each plumbing circuit. Also, there is no accommodation in the prior art for protection of the air blower and its associated piping. Although, the air blower functions to blow air into the spa, it is a common occurrence for water to leak back through air injector valves 4 into air blower piping 6 (FIG. 1). Consequently, water inside air blower piping 6 can also expand upon freezing causing severe, costly damage. Another disadvantage is that the plumbing temperature sensor disclosed in the prior art is located at the water heater which causes the sensor to return a value for plumbing water temperature that is actually warmer than

the true water temperature in most of the plumbing. This means that water in certain parts of the plumbing may freeze while the water near sensor 5 is still in a liquid state.

What is needed is a better freeze control system for spas.

### SUMMARY OF THE INVENTION

The present invention provides a freeze control system for a spa for maintaining the temperature of the water inside the spa and the spa's associated piping above the freezing level. Elements include: 1) a heating element for heating the water, 2) at least one pump for pumping the heated water, 3) a first sensor for detecting the temperature of the water in the spa tub, 4) a second sensor for detecting the temperature of the ambient air around the spa, and 5) a computer programmed to process signals generated by the first sensor and the second sensor, wherein the computer selectively activates and deactivates the heating element and the at least one pump.

### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a prior art spa.

FIG. 2 shows a first preferred embodiment of the present invention.

FIG. 3 shows a second preferred embodiment of the present invention.

FIG. 4 shows a perspective view of the second preferred embodiment of the present invention.

FIG. 5 shows a detailed view of the spa controller.

FIG. 6 shows a perspective view of the first preferred embodiment of the present invention.

### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A detailed description of a preferred embodiment of the present invention is seen by reference to FIGS. 2 – 6.

### First Preferred Embodiment

As seen in FIG. 2, spa 2 contains sensor 17. In a first preferred embodiment sensor 17 is mounted to mounting board 22 underneath spa skirt 20 near spa 2's piping, as shown in FIG. 6. This location is chosen so that sensor 17 is exposed to the air that is near the piping system of spa 2. In a preferred embodiment, spa controller 12 contains a CPU that is programmed to maintain the temperature of the water in spa tub 7 and the water in spa 2's piping in an optimum operating range (i.e., below a level that is too hot for a user, but above the level which would cause freezing of the water in spa 2's piping). As in the prior art, sensor 3 senses the temperature of the water in spa tub 7. Sensor 5 senses the temperature of water near water heater 9.

In the present invention, sensor 3 is still part of the freeze control system in that when the temperature in spa tub 7 drops below a first predetermined value, sensor 3 sends a signal to spa controller 11. This first predetermined value can be high (i.e., 104 deg. F.) for spas that get fairly regular use, or low (i.e., 59 deg. F) for example, for a homeowner who did not plan on using his spa for an extended period of time. In the first preferred embodiment, Spa controller 11 is model number SSPA, manufactured by Gecko Electronique with offices in Quebec City, Quebec, Canada. Spa controller 11 turns on heater 9 and water pump 13 when the temperature in spa tub 7 drops below the first predetermined value. Hot water is then pumped back into spa tub 7. Heater 9 and water pump 13 will remain on until sensor 3 reports a second predetermined temperature slightly above the first predetermined temperature. However, in the preferred embodiment of the present invention, sensor 5 is no longer part of the freeze control system. Instead, sensor 5 is used only to shut off heater 9 when the temperature at heater 9 gets too hot (approximately 119 deg. F.).

In the present invention, sensor 17 has been added to the system and senses the temperature of ambient air around spa 2's piping. In the preferred embodiment of the present invention, sensor 17 is a HT Thermistor sensor (part no. Gecko: 530SB0016) manufactured by Ishicuka Electronic with offices in Japan.

In this first preferred embodiment, sensor 17 detects the true value of ambient air near the piping of spa 2. The programming of spa controller 12 has been modified from spa controller 11 (FIG. 1) to include the ability to be able to utilize information reported by sensor 17 to better regulate the water temperature of spa 2 to prevent freezing of its associated piping.

Applicants call this programming “Smart Winter Mode” and its functionality is illustrated by reference to Table 1 below.

TABLE 1

Ambient Air Temp	Conduct a 1 minute purge every:
40 deg. F.	2 hours
28 deg. F.	1 hour
14 deg. F.	30 minutes
5 deg. F.	15 minutes

In the first preferred embodiment, as the temperature at sensor 17 decreases to 40 deg. F sensor 17 will send an electrical signal to spa controller 12. Spa controller 12 will then start water pumps 13 and 14 and air blower 16. They will each run for 1 minute every two hours. As shown in Table 1, if the temperature drops to 28 deg. F at sensor 17, water pumps 13 and 14 and air blower 16 will conduct a 1-minute purge every hour. Likewise, when sensor 17 reports a temperature of 14 deg. F, the system will purge every 30 minutes and at 5 deg. F. the system will purge every 15 minutes. In the first preferred embodiment, as an extra added measure of protection, after the ambient has risen above 40 deg. F., spa controller 12 will continue to run water pumps 13 and 14 and air blower 16 for one minute every 2 hours for the next 24 hours.

#### Second Preferred Embodiment

A second preferred embodiment is seen by reference to FIGS. 3, 4 and 5. In the second preferred embodiment, sensor 17 is attached directly to printed circuit board (PCB) 12A inside spa controller 12, as shown in FIGS 4 and 5. In the second preferred embodiment, Spa controller 12 is model number SSPA, manufactured by Gecko Electronique with offices in Quebec City, Quebec, Canada. By attaching sensor 17 directly to PCB 12A, a substantial cost savings is realized in that the expense of mounting sensor 17 at another

location near spa 2's piping (as was shown in the first preferred embodiment) is avoided. In other words, when sensor 17 is mounted on PCB 12A, funds that would be spent on cabling, housing and connectors are saved. However, it should be noted that when sensor 17 is mounted to PCB 12A, sensor 17 is exposed not only to ambient air temperature, but also to the temperature of the area around PCB 12A which is heated by the other components also attached to PCB 12A. Hence, a correction factor needs to be programmed into spa controller 12 account for the heat generated by spa controller 12's components. Through experimentation for spa controller 12 model number SSPA, Applicants have determined the following correlation shown in Table 2:

TABLE 2

Temp at Sensor 17	Ambient Air Temp.	Conduct a 1 minute purge every:
68 deg. F	40 deg. F.	2 hours
59 deg. F	28 deg. F.	1 hour
54 deg. F	14 deg. F.	30 minutes
50 deg. F	5 deg. F.	15 minutes

In the second preferred embodiment, as the temperature at sensor 17 decreases to 68 deg. F (ambient air temp. = 40 deg. F), sensor 17 will send an electrical signal to spa controller 12. Spa controller 12 will then start water pumps 13 and 14 and air blower 16. They will each run for 1 minute every two hours. As shown in Table 1, if the temperature drops to 59 deg. F at sensor 17, water pumps 13 and 14 and air blower 16 will conduct a 1-minute purge every hour. Likewise, when sensor 17 reports a temperature of 54 deg. F, the system will purge every 30 minutes and at 50 deg. F. the system will purge every 15 minutes. As an extra added measure of protection, after the ambient has risen above 40 deg. F. (i.e., sensor 17 reports a Temp = 68 deg. F), spa controller 12 will continue to run water pumps 13 and 14 and air blower 16 for one minute every 2 hours for the next 24 hours.

The above-described invention is an improvement over the prior art in that it provides a much more reliable and effective manner of preventing freezing while at the same time minimizing costs.

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While the above description contains many specifications, the reader should not construe these as limitations on the scope of the invention, but merely as exemplifications of preferred embodiments thereof. Those skilled in the art will envision many other possible variations are within its scope. For example, although the above embodiments described a spa that has an air blower, there are many spas that do not have air blowers. The above invention would work equally well for spas without air blowers. For example, spa controller 12 would be programmed to start the water pumps when sensor 17 detected a low temperature. Also, although the above embodiments discuss using model number SSPA for spa controller 12, those of ordinary skill in the art will recognize that it would be possible to substitute a different spa controller for spa controller 12. For the second preferred embodiment, if a different spa controller 12 is used, a new correction factor would have to be calculated to determine a correlation table appropriate for the different spa controller. Accordingly the reader is requested to determine the scope of the invention by the appended claims and their legal equivalents, and not by the examples which have been given.

We Claim:

1. A freeze control system for a spa for maintaining the temperature of the water inside the spa and the spa's associated piping above the freezing level, comprising:
  - A. a heating element for heating the water,
  - B. at least one pump for pumping the heated water,
  - C. a first sensor for detecting the temperature of the water in the spa tub,
  - D. a second sensor for detecting the temperature of the ambient air around the spa's equipment, and
  - E. a computer programmed to process signals generated by said first sensor and said second sensor, wherein said computer selectively activates and deactivates said heating element and said at least one pump.
2. A freeze control system as in Claim 1, wherein said computer comprises computer components, wherein said second sensor is mounted so as to be relatively unaffected by heat generated by said computer components.
3. A freeze control system as in Claim 1, wherein said computer comprises computer components, wherein said second sensor is mounted so as to be affected by heat generated by said computer components.
4. A freeze control system as in Claim 3, wherein said computer programming comprises a correction factor to account for the heat generated by said computer components.
5. A freeze control system as in Claim 1, wherein said computer is programmed to start and run said at least one pump for a predetermined period of time at intervals based on the temperatures reported by said second sensor.
6. A freeze control system as in Claim 1, wherein said predetermined period of time is one minute.

7. A freeze control system for a spa for maintaining the temperature of the water inside the spa and the spa's associated piping above the freezing level, comprising:

- A. a heating element for heating the water,
- B. at least one pump for pumping the heated water,
- C. at least one air blower for blowing air into the spa tub,
- D. a first sensor for detecting the temperature of the water in the spa tub,
- E. a second sensor for detecting the temperature of the ambient air around the spa's equipment, and
- F. a computer programmed to process signals generated by said first sensor and said second sensor, wherein said computer selectively activates and deactivates said heating element, said at least one pump and said at least one air blower.

8. A freeze control system as in Claim 7, wherein said computer comprises computer components, wherein said second sensor is mounted so as to be relatively unaffected by heat generated by said computer components.

9. A freeze control system as in Claim 7, wherein said computer comprises computer components, wherein said second sensor is mounted so as to be affected by heat generated by said computer components

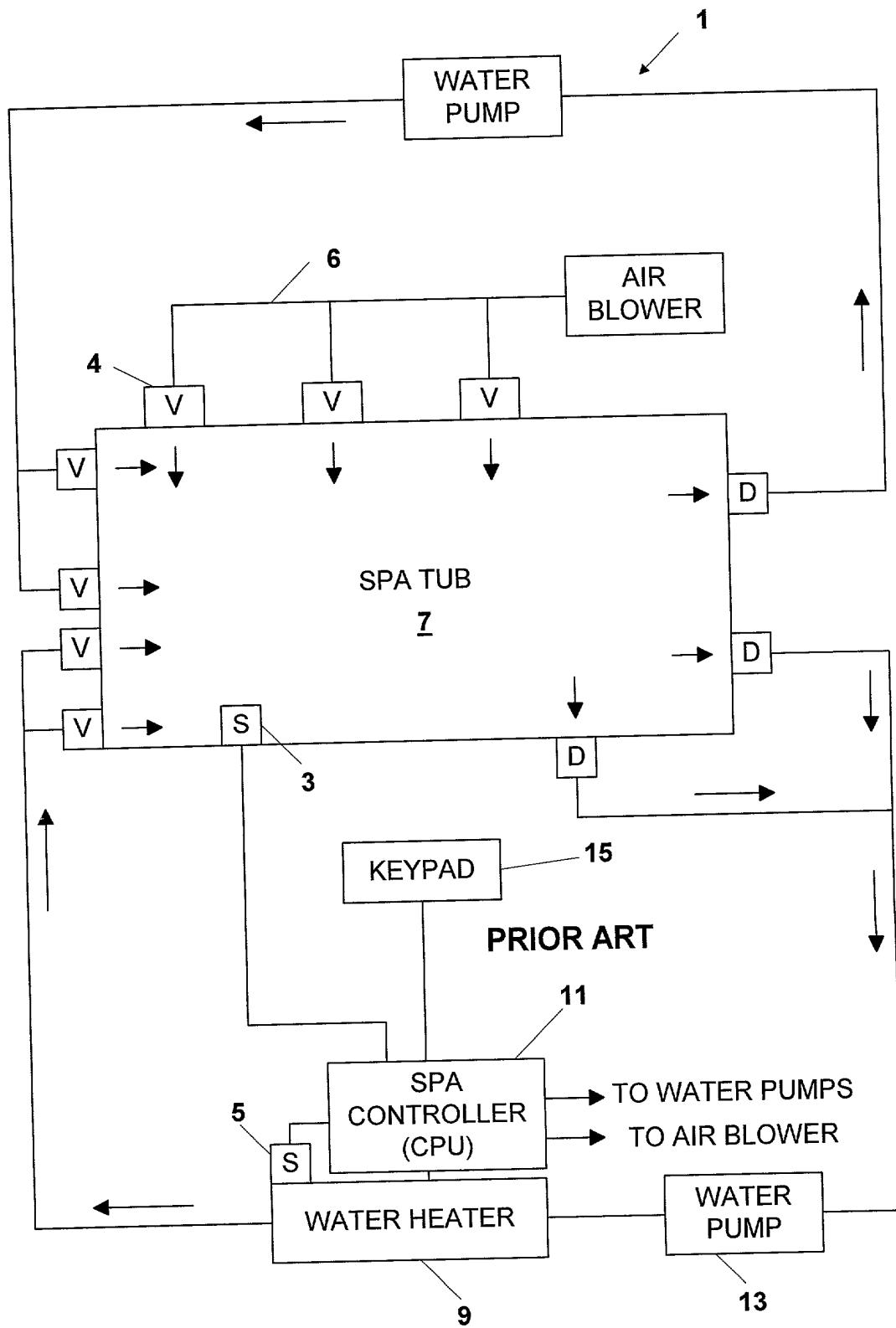
10. A freeze control system as in Claim 9, wherein said computer programming comprises a correction factor to account for the heat generated by said computer components.

11. A freeze control system as in Claim 1, wherein said computer is programmed to start and run said at least one pump and said at least one blower for a predetermined period of time at intervals based on the temperatures reported by said second sensor.

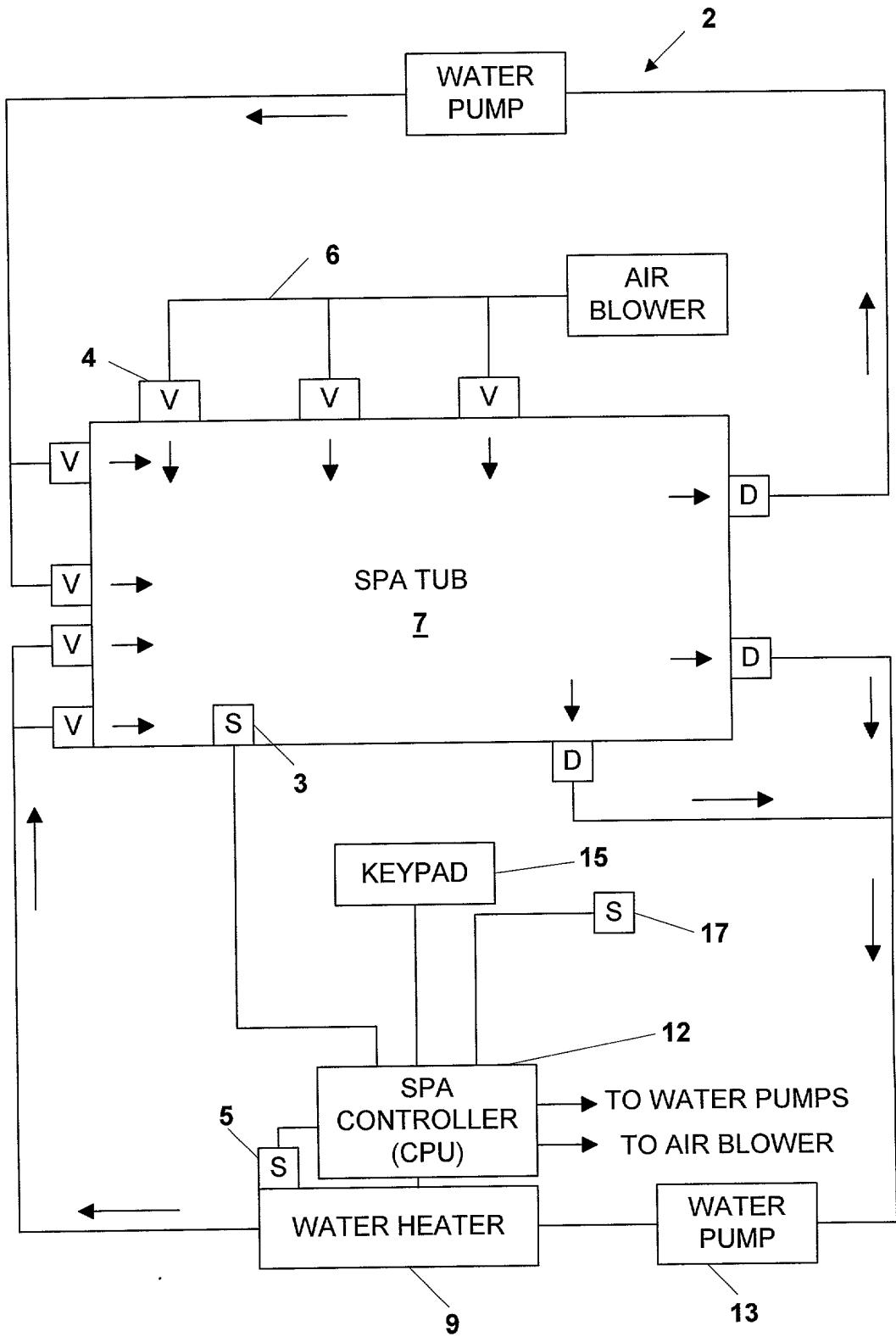
12. A freeze control system as in Claim 1, wherein said predetermined period of time is one minute.

## ABSTRACT

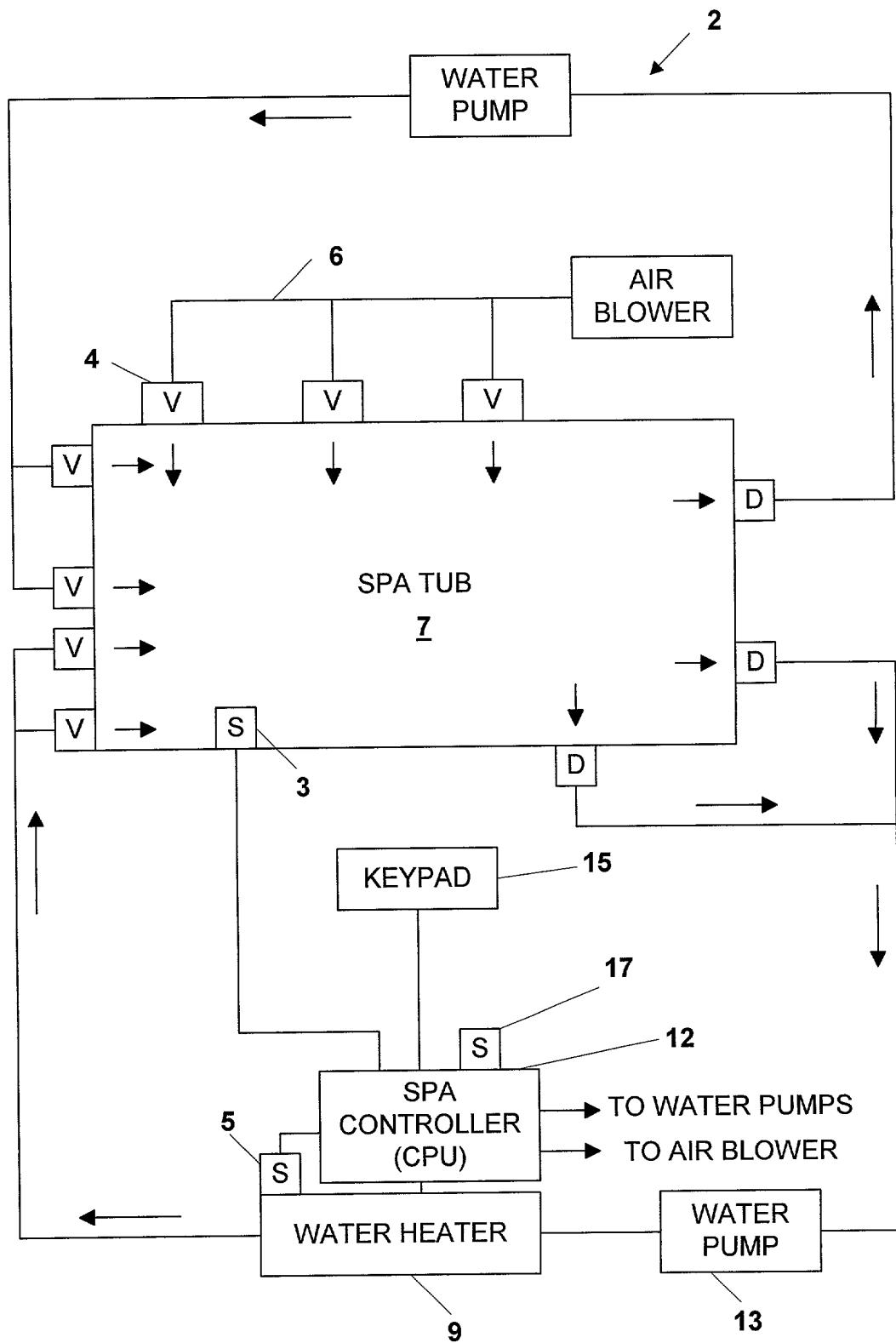
A freeze control system for a spa for maintaining the temperature of the water inside the spa and the spa's associated piping above the freezing level. Elements include: 1) a heating element for heating the water, 2) at least one pump for pumping the heated water, 3) a first sensor for detecting the temperature of the water in the spa tub, 4) a second sensor for detecting the temperature of the ambient air around the spa, and 5) a computer programmed to process signals generated by the first sensor and the second sensor, wherein the computer selectively activates and deactivates the heating element and the at least one pump.



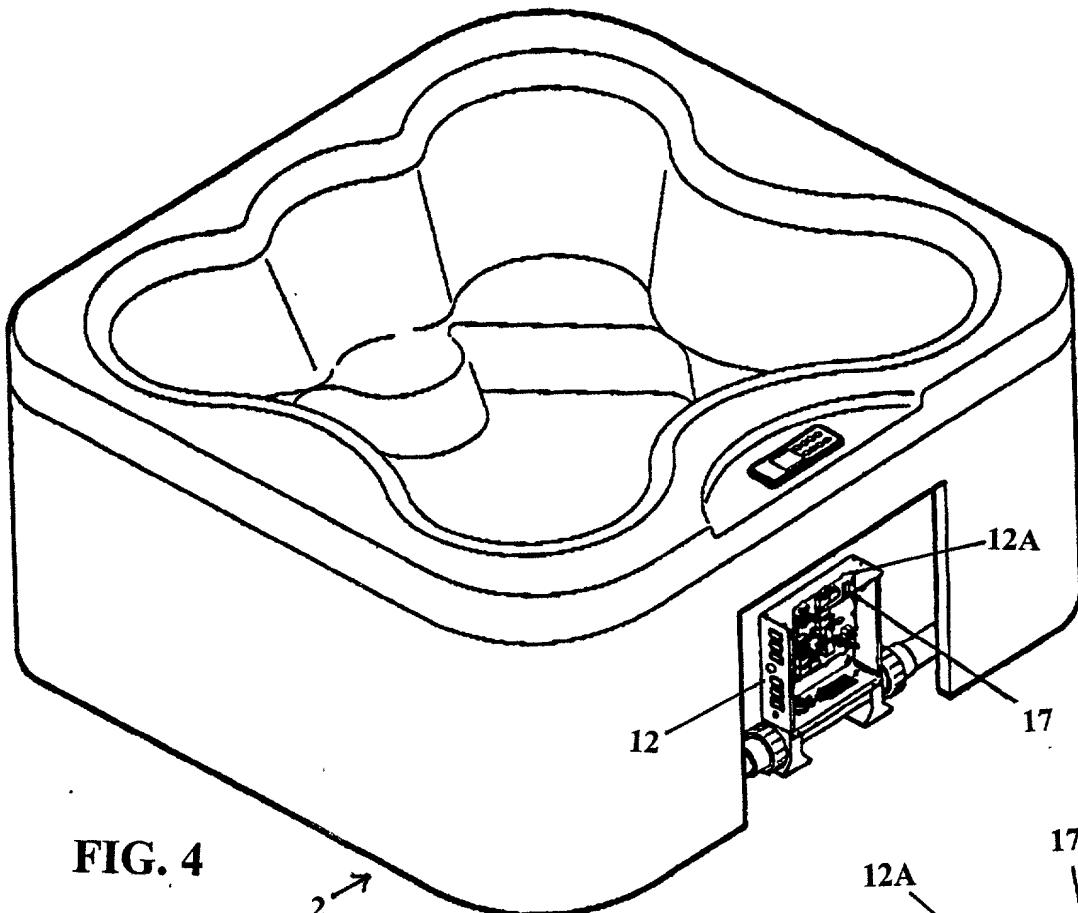
**FIG. 1**



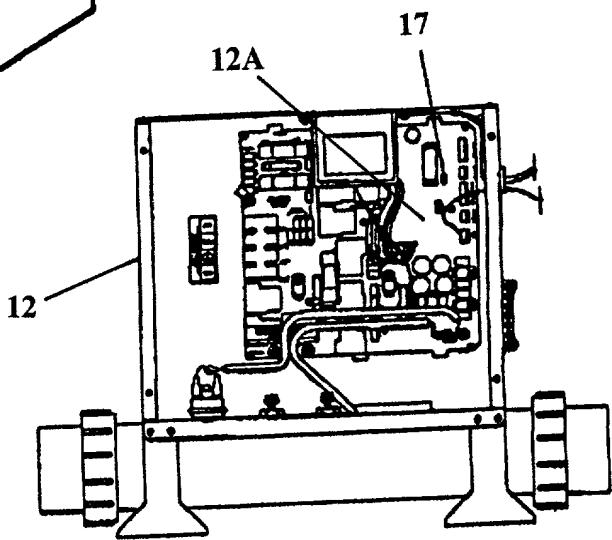
**FIG. 2**



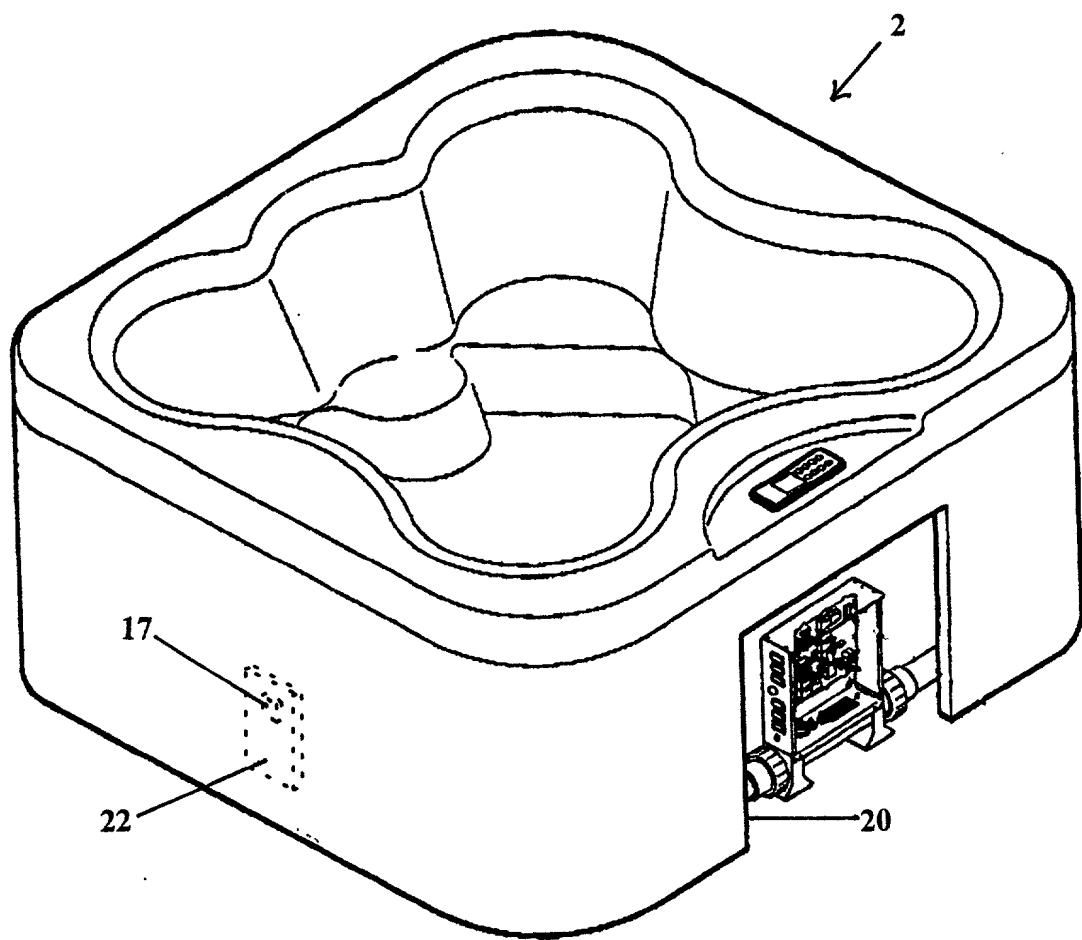
**FIG. 3**



**FIG. 4**



**FIG. 5**



**FIG. 6**

Docket No. 

# Declaration and Power of Attorney For Patent Application

## English Language Declaration

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

**WATER FREEZE CONTROL FOR HOT TUB SPA**

the specification of which

(check one)

is attached hereto.

was filed on \_\_\_\_\_ as United States Application No. or PCT International Application Number \_\_\_\_\_  
and was amended on \_\_\_\_\_  
(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d) or Section 365(b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)

Priority Not Claimed

(Number)	(Country)	(Day/Month/Year Filed)	<input type="checkbox"/>
(Number)	(Country)	(Day/Month/Year Filed)	<input type="checkbox"/>
(Number)	(Country)	(Day/Month/Year Filed)	<input type="checkbox"/>

I hereby claim the benefit under 35 U.S.C. Section 119(e) of any United States provisional

60/106,229 10/30/98  
(Application Serial No.) (Filing Date)

(Application Serial No.) (Filing Date)

(Application Serial No.) (Filing Date)

I hereby claim the benefit under 35 U. S. C. Section 120 of any United States application(s), or Section 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. Section 112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, C. F. R., Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

(Application Serial No.) (Filing Date) (Status)  
(patented, pending, abandoned)

(Application Serial No.) (Filing Date) (Status)  
(patented, pending, abandoned)

(Application Serial No.) (Filing Date) (Status)  
(patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. *(list name and registration number)*

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